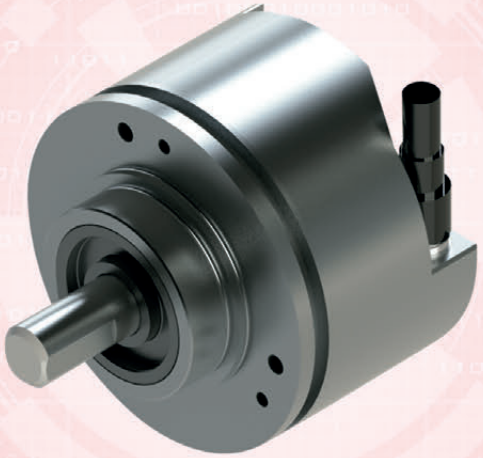
USER MANUAL *v1.0*



INCREMENTAL ENCODER

PROGRAMMABLE

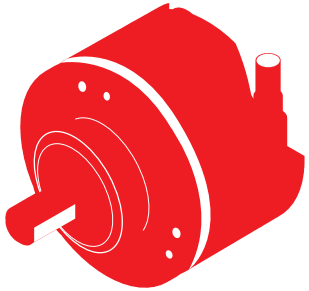
SERIE PR90 / PR90H

hohner

Elektrotechnik Werne

hohner
Elektrotechnik Werne

USER MANUAL PR90 / PR90H



1

PR90 / PR90H

Features	**p. 4**
Auto sensig features	**p. 5**
Working margins	**p. 5**
Protection	**p. 6**

2

CONNECT

Requirements	**p. 8**
Connection Steps	**p. 9**
Connect to PC	p. 9
Install software	p. 9
Run the program	p. 12

3

PROGRAM

Overview	**p. 14**
Instructions	**p. 15**
Monitoring	**p. 17**
Alarm panel	**p. 18**
Considerations	**p. 19**

hohner
Elektrotechnik Werne

1

PR90 / PR90H

Features

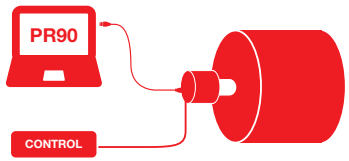
USB and graphical interface programming options for the PR90 programmable incremental optical encoder:

- Incremental optical encoder, programmable for any possible number of pulses from 1 to 65.536 pulses per rotation.
- Output Level selectable - HTL (Push-Pull) / TTL (RS422) regardless of input voltage.
- Reference signal width (Z) - 90º or 180º
- Reference signal positioning (Z) electrical vs. mechanical – 0º to 360º
- Selectable rotation direction:
  CW (as seen from the axis, clockwise rotation)
  CCW (as seen from the axis, counter-clockwise rotation)
- Independent channel by channel inversion option.
  Very useful in case of connection errors.
- Remote maintenance and programming options.

Direct USB2 to USB2 encoder connection to any computer or Tablet-PC running Windows, MAC OS or Linux, without the need for intermediate adapter boxes.

- **Power-On programming**
  (encoder powered up)

  Encoder can be programmed while it is powered up, with no need to disconnect it from the machine.



- **Power-Off programming**
  (without powering up the encoder)

  Ability to program the encoder without the need for it to be powered up, only by connecting the encoder to the PC programmer.

Hohner Elektrotechnik GmbH | Gewerbehof 1 D-59368 Werne
Telefon: (0 23 89) 98 78-0 Telefax: (0 23 89) 98 78-27 | info@hohner-elektrotechnik.de www.hohner-elektrotechnik.de

Auto sensing features

Automatic voltage detection. The equipment determines the output level (HTL/TTL) according to input voltage. From 4.5Vdc to 10Vdc output will remain in TTL, from 11Vdc to 30Vdc output level will be maintained in HTL as long as the device is programmed for HTL output.

Automatic overload detection in the encoder driver. In the event of a short circuit or overload in any of the outputs, the device will switch to TTL until the error is remedied. The encoder's LED with blink red and the graphic interface will display the relevant red indicator, registering the error, without interrupting the normal function of the device.

Automatic Driver/PLC input impedance detection. When the encoder is programmed for HTL outputs, if a driver/PLC with TTL inputs (120O x Channel) is connected, the encoder will switch outputs to TTL automatically.

Automatic humidity detection inside the encoder. Water, humidity and condensation alarms. The encoder's LED with blink red and the graphic interface will display the relevant red indicator, registering the error, without interrupting the normal function of the device.

Optical error detection. Any dysfunction in the OptoAsic illumination or breakage of any of the optical elements is automatically detected and is described by the graphical interface alarms, logging the error, without interrupting the normal operation of the encoder.

Working margins

The PR90 is ready to work from 4.5 Vdc to 30 Vdc, with HTL and TTL loads

Operating temperature range from -20ºC to +85ºC

Protection IP65

Humidity levels should not surpass 98% without condensation

Protection

- **Over voltage and power supply inversion protection.** The encoder is protected to prevent its destruction in case of reverse polarity of power and/or spikes exceeding 35Vdc.

- **Voltage drops.** The device stops working below 3.9 Vdc. Up to this point the PR90 maintains the outputs at standard TTL levels, and if the voltage drop has been excessively slow the encoder goes into protection mode; to reset the rated voltage to recover its normal operation you must just turn it off and on again.

- **Electrostatic and/or electromagnetic discharges.** Complies with the EMC directive (UNE-EN 61000-6-2:2006 + ERR:2009 and UNE-EN 61000-6-3:2007 + A1:2012). Although the equipment is protected to withstand electrostatic discharge above ± 15KVolt., occasionally the signal may lose a certain number of pulses during the discharge, at this point the equipment will reset the signal in under 100msec, the standard delay for a Watch-Dog circuit.

- **Active reset of the high-efficiency uController.** This circuit resets uController operation in extreme cases of malfunction. For example, this situation can occur in unstable or high-noise power connections.

- **False power connections.** The encoder is protected to withstand being switched on and off repeatedly within the margins of usual operation, without the equipment being harmed.

  ⚠ *It is not recommendable, like with any other electrical device, to turn the equipment on and off repeatedly in rapid succession while connected to mains power.*

- The electronic circuit has **ultra-fast electronic fuses**; in the event of a fault or failure, these fuses avoid greater damage and more expensive repairs.

- Electronics designed under the **BSI security regulations**, so as to avoid smoke and fire.

- **4-layer printed circuit** designed under MIL standards, to offer greater mechanical robustness in order to avoid external radio-magnetic influences.

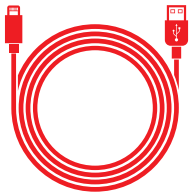
hohner

Elektrotechnik Werne

2

connect

Requirements



A uUSB/USB cable

A PC or Tablet-PC running
Windows, Mac OS o Linux
(with the latest version of Java installed)

Download the
programming software from the
Hohner Automaticos website

Minimum system requirements for the programming computer:

- 32 or 64 bit OS, Java compatible.
- Recommended OSs: Windows XP, OS 6, Ubuntu 11, Fedora 16 or higher. Other Java-compatible OSs may work, but they have not been tested.
- The computer must have the latest version of Java installed, where the RXTX communication libraries will be added. Details of this process will be listed in the installation instructions.
- The programming computers must have a free USB1 or USB2 port.
- Recommended configuration, the computer should have at least an Intel I3 or similar processor and 2 GB or RAM. Other, less powerful, computers may also be used, but this will decrease programming and monitoring speeds.
- It is recommended that you have an internet connection, both to keep the software and the database updated, and to make remote maintenance of the encoder possible.
- Before proceeding to connection and programming, you must make sure that the computer is virus and trojan-free.

For the PR90 programmable incremental optical encoder to work correctly, you must follow the detailed configuration instructions below:

Make sure, before you connect the encoder, that the configuration required for the encoder is the correct type for your application.

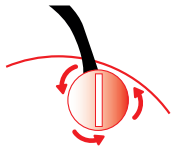
Pay special attention to the TTL / HTL output configuration, since if the proper voltage output is not selected, the devices connected to the encoder could report read errors.

Step 1: Connect the PR90 encoder to a USB port

1.1 direct connection to a USB port

You must open the connection cover located at the back of the PR90 encoder.

The connection is direct, using a uUSB / USB cable to connect to any computer or tablet-pc, without any other equipment being required.



Step 2: Programming software installation

2.1 install Java on your computer

Java
Buscar
Descargar
Ayuda
Todas las descargas de Java
Si desea descargar Java para otra computadora o sistema operativo, haga clic en el enlace que aparece a continuación.
Todas las descargas de Java
Descarga gratuita de Java
Descargue Java para su computadora de escritorio ahora
Version 8 Update 45
Fecha de versión: 14 de abril de 2015
Descarga gratuita de Java

You can install the latest version of Java from the Web:

https://www.java.com/es/download/

Software compatible from **version 8.45** *of Java*

2.2 download the programming software

From the Hohner website, download the programming software required for your Operating System.

PR90 WINDOWS 32/64-bit

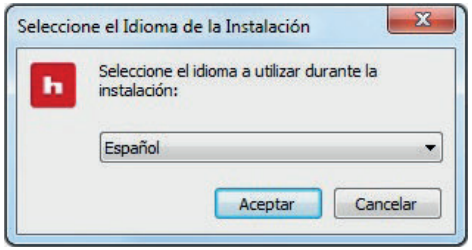
PR90 Mac OS X 32/64-bit

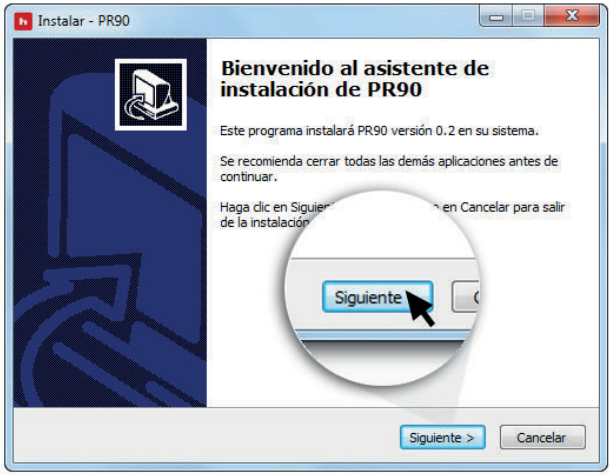
2.3 decompress and run the installation program

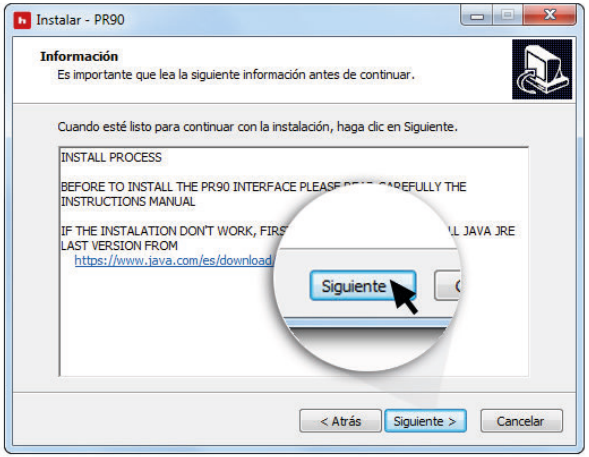
Once the programming software has been downloaded, decompress the .zip file and run the installation program by clicking on the corresponding icon.

It is preferable to deactivate automatic Java updates. Otherwise, when Java updates, the interface will stop working and you will have to download the newest version of the software.

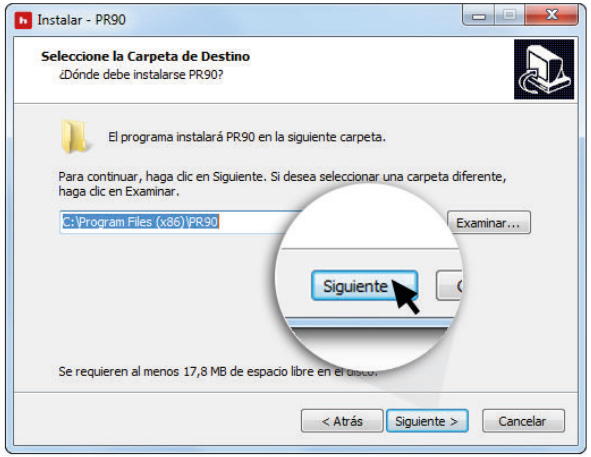
Choose the language, and follow the instructions on screen: A



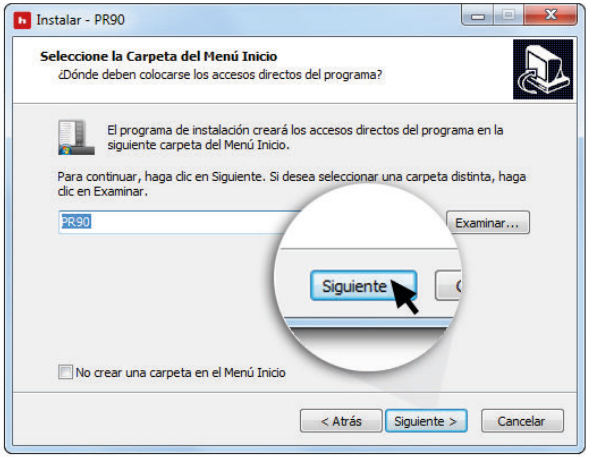

Instalar - PR90
Bienvenido al asistente de instalación de PR90
Este programa instalará PR90 versión 0.2 en su sistema.
Se recomienda cerrar todas las demás aplicaciones antes de continuar.
Siguiente
Siguiente >
Cancelar


Instalar - PR90
Información
Es importante que lea la siguiente información antes de continuar.
Cuando esté listo para continuar con la instalación, haga clic en Siguiente.
INSTALL PROCESS
BEFORE TO INSTALL THE PR90 INTERFACE PLEASE
INSTRUCTIONS MANUAL
IF THE INSTALATION DON'T WORK, FIRS
LAST VERSION FROM
https://www.java.com/es/download/
Siguiente
< Atrás
Siguiente >
Cancelar

B Automatic alert about the installation process and the Java version


Instalar - PR90
Seleccione la Carpeta de Destino
¿Dónde debe instalarse PR90?
El programa instalará PR90 en la siguiente carpeta.
Para continuar, haga clic en Siguiente. Si desea seleccionar una carpeta diferente, haga clic en Examinar.
C:\Program Files (x86)\PR90
Examinar...
Siguiente
Se requieren al menos 17,8 MB de espacio libre en el disco.
< Atrás
Siguiente >
Cancelar

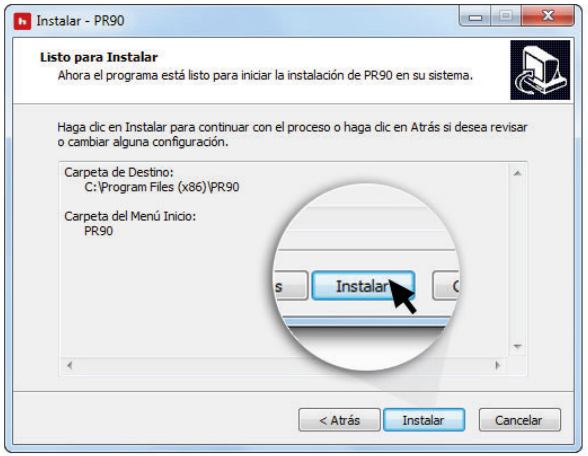
C The program will install PR90 - HOHNER in the chosen folder


Instalar - PR90
Seleccione la Carpeta del Menú Inicio
¿Dónde deben colocarse los accesos directos del programa?
El programa de instalación creará los accesos directos del programa en la siguiente carpeta del Menú Inicio.
Para continuar, haga clic en Siguiente. Si desea seleccionar una carpeta distinta, haga clic en Examinar.
PR90
Examinar...
Siguiente
No crear una carpeta en el Menú Inicio
< Atrás
Siguiente >
Cancelar

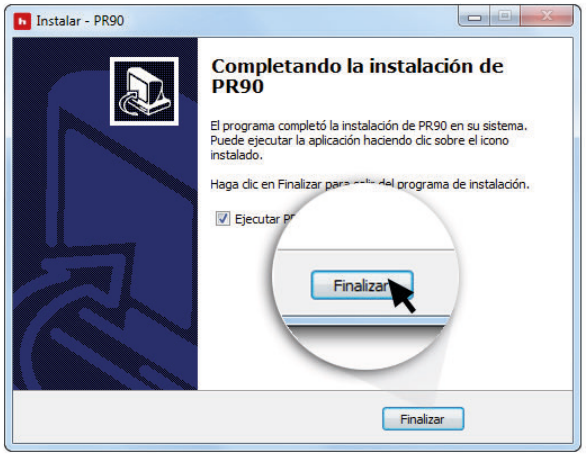
D The installation will create short cuts to the program in the chosen Start Menu folder

Instalar - PR90
Seleccione las Tareas Adicionales
¿Qué tareas adicionales deben realizarse?
Seleccione las tareas adicionales que desea que se realicen durante la instalación de PR90 y haga clic en Siguiente.
Iconos adicionales:
Crear un icono en el escritorio
Siguiente
< Atrás
Siguiente >
Cancelar

E Choose the additional tasks; create a desktop icon


Instalar - PR90
Listo para Instalar
Ahora el programa está listo para iniciar la instalación de PR90 en su sistema.
Haga clic en Instalar para continuar con el proceso o haga clic en Atrás si desea revisar o cambiar alguna configuración.
Carpeta de Destino:
C:\Program Files (x86)\PR90
Carpeta del Menú Inicio:
PR90
Instalar
< Atrás
Instalar
Cancelar

F The program is ready and configured for installing PR90 on your system


Instalar - PR90
Completando la instalación de PR90
El programa completó la instalación de PR90 en su sistema. Puede ejecutar la aplicación haciendo clic sobre el icono instalado.
Haga clic en Finalizar para
del programa de instalación.
Ejecutar
Finalizar
Finalizar

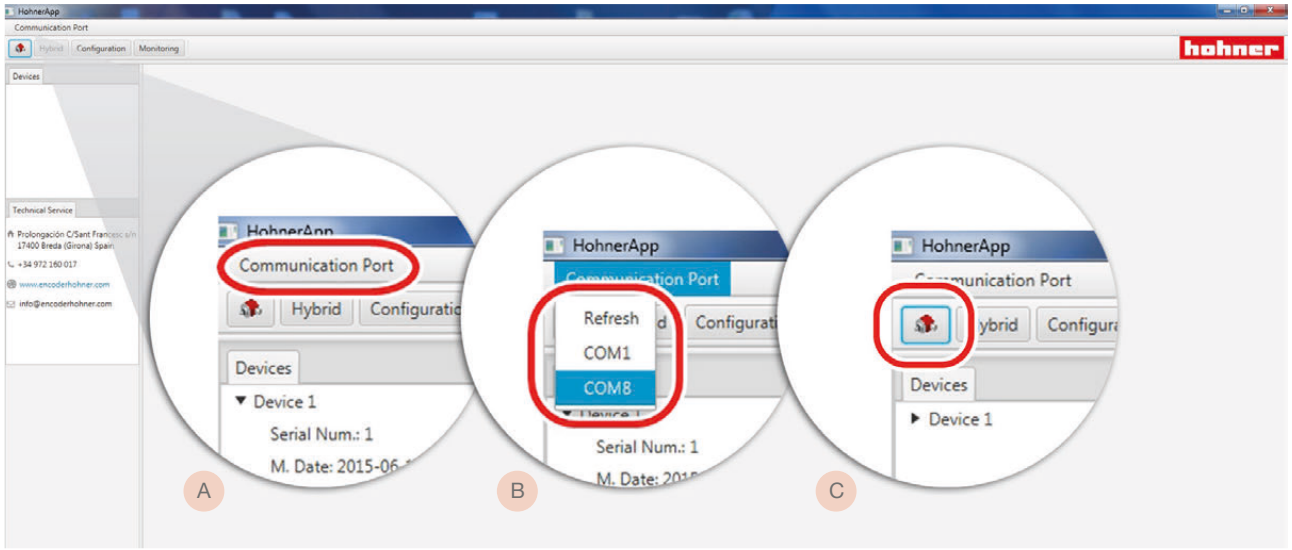
G Finish the installation and exit the installation wizard

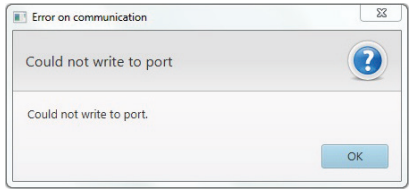
Step 3: Run the programming software

3.1 configure the COM port

Without disconnecting the PR90 from any of the computer or tablet's USB ports, open the **"Communication Port"** A menu on the interface, choose the corresponding **communications port (COMX)**, B where the encoder is connected.

Once chosen, click on the button in the upper bar. C In approximately 2 seconds the programming interface will fill out with the monitoring and programming screens.





If an error message appears, click on "Refresh" and then choose the port where the PR90 is connected B *from the drop-down menu.*

hohner
Elektrotechnik Werne

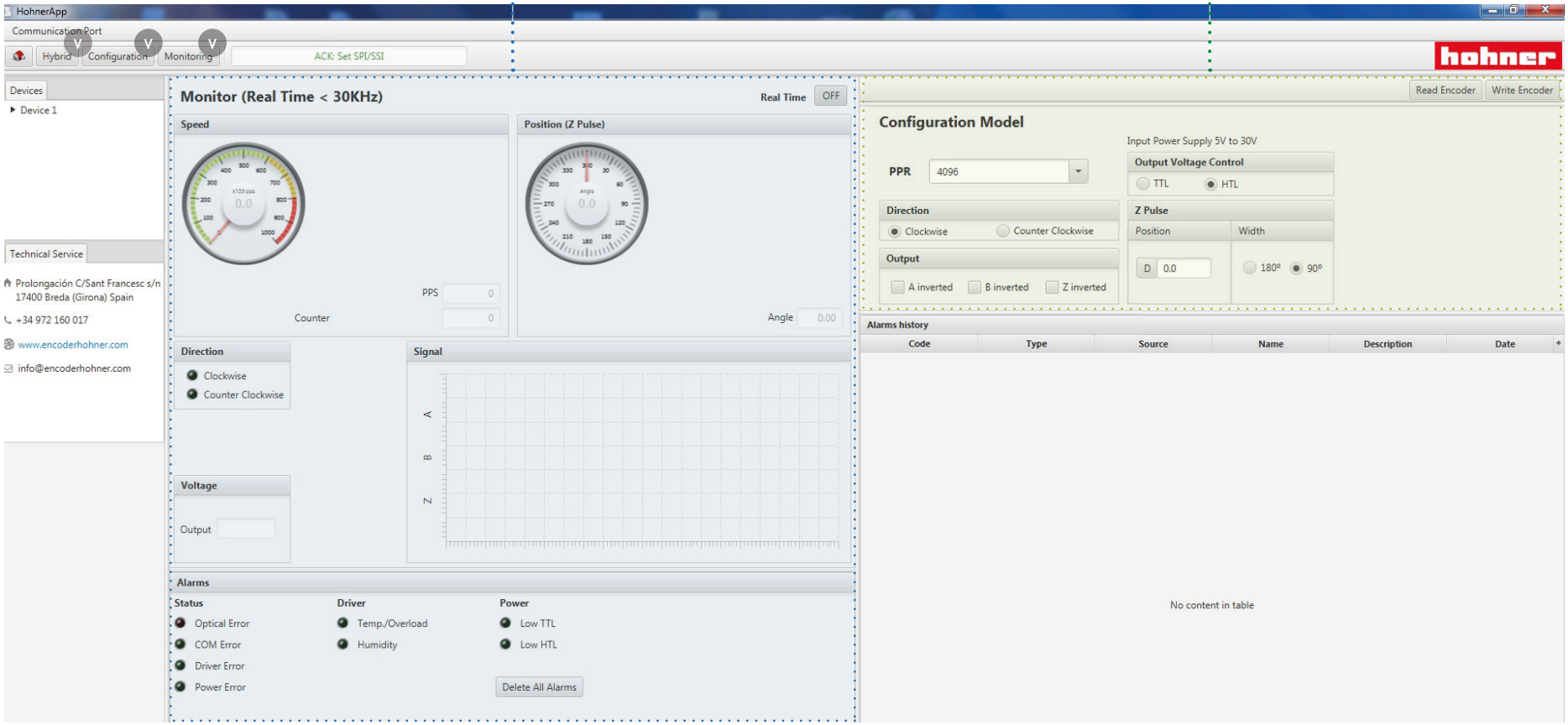
3

program

When you connect the device, the computer will recognize the PR90 and you will hear the connecting devices sound and will see a flashing green led on the encoder ☀ for 1 second.

Monitoring Screen

Programming Screen



V **Visualization Options** Hybrid *See monitoring and programming screen* Configuration *See only programming screen* Monitoring *See only monitoring screen*

Programming Instructions

The configurable parameters are:

> ⚠ *During Power-On programming (encoder powered-up), the PR90 should NEVER be programmed with the machine in operation.*
> *At the time of programming information can be lost until programming has finished, and this could cause unexpected behaviour in the machine connected to the encoder.*

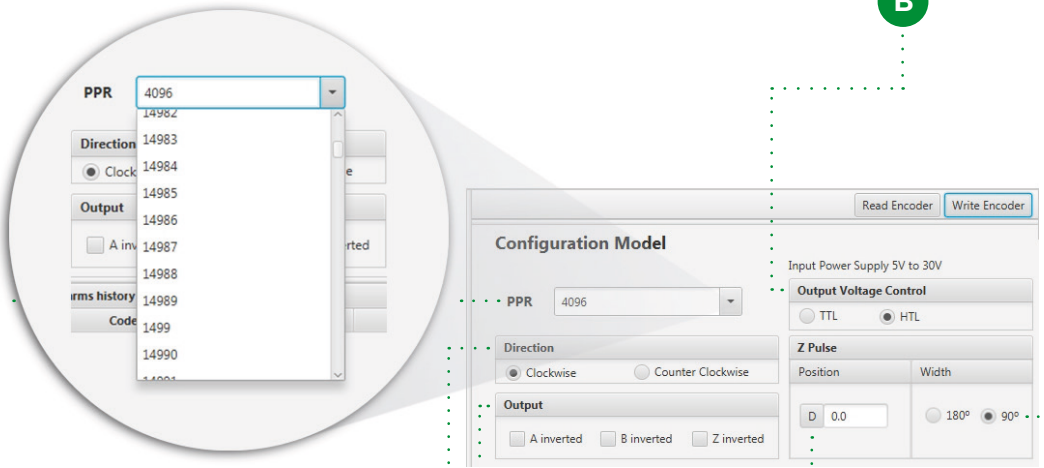
Pulses per revolution (PPR)

from 1 to 65.536 PPR

PPR programming can be carried out by clicking on the different values in the table or by interacting with the keyboard. However, the desired value will not be selected for your programming unless you select it from the drop-down menu.

A

For example: if you want to enter a value of 10,000 PPR, open the PPR drop-down menu, keying in 10,000.
Then, select the desired value with a mouse click in the drop-down menu.



Output type

TTL (RS422 5Vpp. Differential)
HTL (Push-Pull 11~30Vpp. Differential)

B

This output can be programmed regardless of input voltage.

> ⚠ *The PR90 encoder considers TTL from 4.5 to 10Vdc and HTL from 11 to 30 Vdc. If input values are below the HTL limit, the PR90 encoder will automatically switch output to TTL..*

C

Rotation direction

CW
(channel A leads B,
view from the shaft,
shaft rotating clockwise)

CCW
(Channel B leads A,
view from the shaft,
shaft rotating counterclockwise)

D

Differential output inversion

channel by channel **A / B / Z**

When you select one of the output channels (channel A, for example), this will switch the differential outputs from A - nA to nA - A.

> ℹ *This option can make physical connection of the encoder to the PLC / Driver.*

E

Reference signal position (Z)

0º to 360º

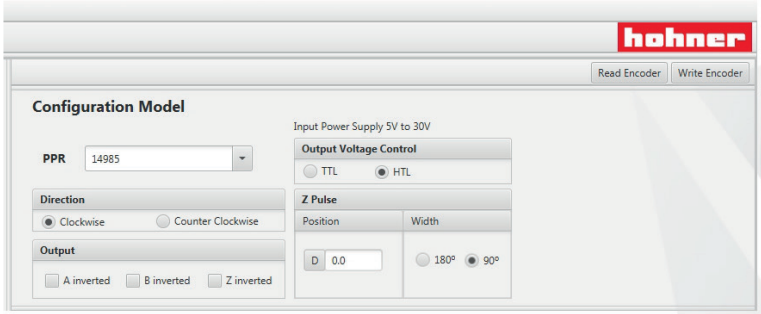
This setting will move the starting point for electrical connection to the mechanical start point, according to the selected mechanical degrees.

A and B channel synchronization will be maintained at all times.

F

Reference signal width (Index, Z, 0)

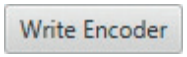
90º (synchronized with A and B)
180º (synchronized with A)



G Write Encoder

Record the configuration to the encoder

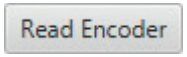
Once these options have been selected, click on "Write Encoder" in the upper task-bar of the programming screen.



The upper task-bar should show green, confirming data recording progress, showing the term "ACK:". Which means that the recording process has finished correctly.

H Read Encoder

We can verify that the data has been recorded correctly by clicking on "Read Encoder" in the upper task-bar in the programming screen.



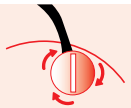
Thus, we verify that the data we have loaded corresponds to the date recorded in the PR90 and that the alarm status has been updated.

Default configuration

The encoder comes default preconfigured with:

- Pulses: 4096 ppr
- Output: HTL
- Direction: Clockwise (CW)
- Reference signal position (Z): 0º
- Reference signal width (Índex, Z, 0): 90º

Once the encoder has been programmed, it is imperative to close the connection cover again to ensure IP65 protection.



Monitoring Screen

A **Pulses per second (PPS)**

The encoder's PPS output is shown, which can be directly translated to frequency.

Also monitored by aPPS-scaled dial (Hz)/125.

C **Rotation direction**

CW / CCW

E **Outputs**

HTL / TTL

F **Alarm panel**

Overload, low power, optical failure, communications failure and humidity alarms.

(See p. 18)

REAL TIME

Press the button to activate the real-time read monitor.

B **Reference signal position (Z Pulse)**

Electrical (Z) vs. Mechanical (0° to 360°) reference signal positioning, in numerical and graphical on the dial.

D **Incremental output signals A / B / Z**

Guidance (not real) graphical representation for outputs A/B/Z, in self-regulating scale.

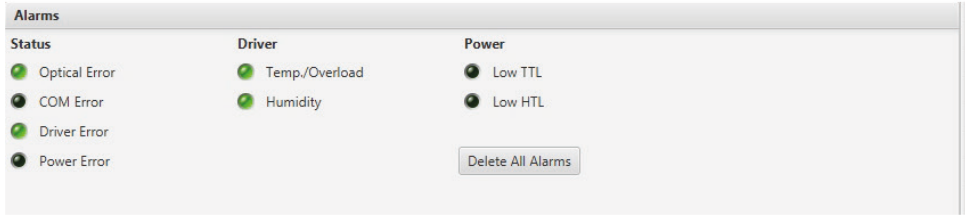
The PR90 encoder can be monitored as long as the read frequency is below 30 KHz (30,000 PPS).

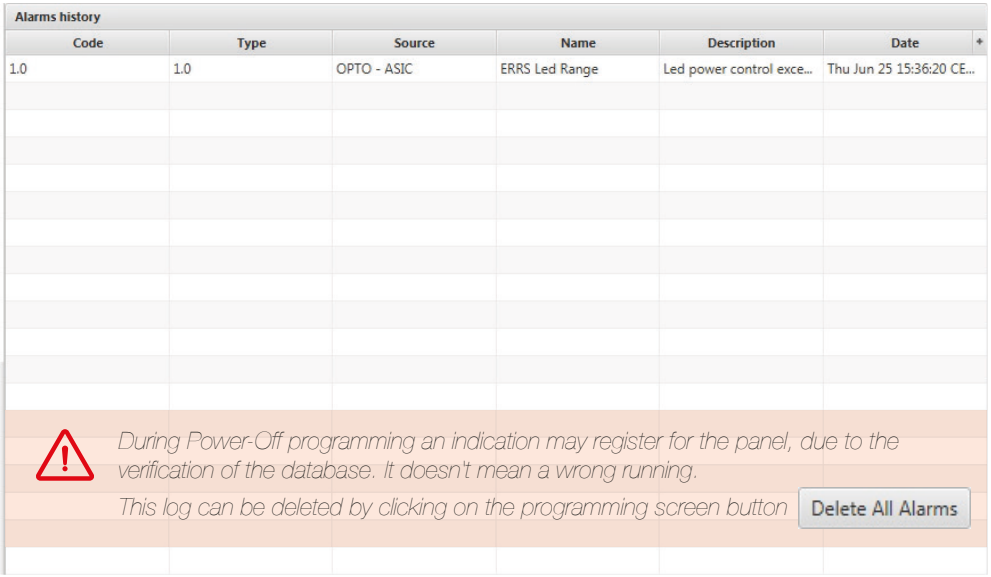
Alarm Panel

This interface screen shows information about the status of the PR90 encoder's alarms and their historical register.

It updates every time verification is carried out by clicking on the programming screen button Read Encoder

- Encoder in perfect working order
- Overload, low power, optical failure, communications failure and humidity alert





Status

- **Optical Error** | Any malfunction in the OptoAsic illumination due to dirt or breakage of an optical element.
  - Coded disk breakage
  - Dirt on the coded disk or photo sensors
  - IR LED spent or fault
  - Asic fault

  Solution: *Hohner Technical Service*

- **COM Error** | Alerts of any error that the uController detects in internal communications.
  - Electromagnetic Discharges (see section "Protections", p. 6). Can cause a communication error, which automatically resets and normalizes.
  - Damage to any of the components, circuit board, fault in the ASIC or uController.

  Solution: *Hohner Technical Service*

- **Driver Error** | Alerts of any overload of the differential output circuits.
  - Short circuit or overload that can damage the Driver power circuit.
  - Fault in the Driver power circuitry.

  Solution: *Hohner Technical Service*

- **Power Error** | Alerts of any drop in voltage or low voltage in the power circuitry.
  - Constant drop in supply voltage below working limits or programmed TTL/HTL output.

  Solution: *Once normal voltage is restored the PR90 regains normal functionality*

Driver

- **Temp./Overload** | Overload or over-heating of Driver circuitry.
- **Humidity** | Alerts of moisture or water on the circuits.

Power

- **Low TTL** | Power is below the TTL working limits.
- **Low HTL** | Power is below the HTL working limits.

Considerations

Power Supply

This incremental encoder allows you to work at any voltage from 5 to 30Vdc without the need for any change or adjustment. However, you should pay attention to the polarity of the Vdc connection.

It is recommended in all instances to use a power supply that support loads in excess of 2 Amp., to ensure a very low power impedance and therefore better signal quality.

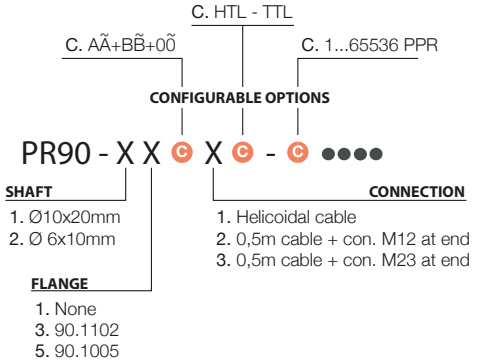
Connectivity

Each differential output channel is identified by the colour of the wires, which plug directly into the differential PLC or Driver inputs. In order to preserve the quality of the signal, this equipment must be mounted on differential resistive loads.

In case of confusion in the connection, this can be corrected without need for disconnection, through the graphical programming interface.

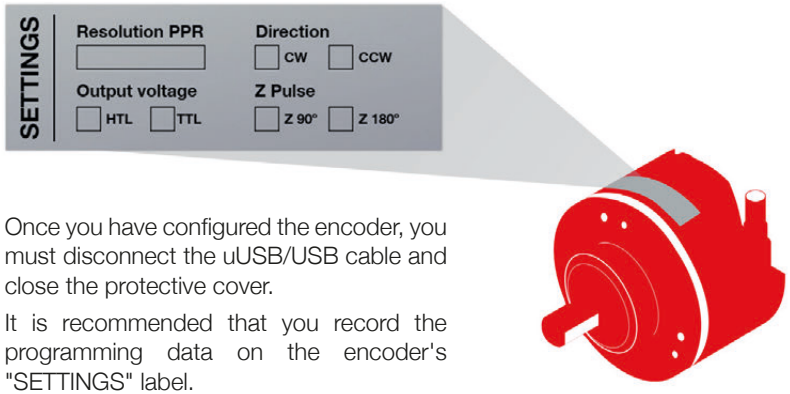
Differentiated earth line

The equipment is absolutely shielded against external influences, electromagnetic fields and discharges. Even so, it is advisable to establish a differentiated earthing circuit. Branched earthing distribution.



Reference

Program labelling and Re-sealing



Once you have configured the encoder, you must disconnect the uUSB/USB cable and close the protective cover.

It is recommended that you record the programming data on the encoder's "SETTINGS" label.

hohner

Elektrotechnik Werne

Hohner Elektrotechnik GmbH | Gewerbehof 1 D-59368 Werne
Telefon: (0 23 89) 98 78-0 Telefax: (0 23 89) 98 78-27 | info@hohner-elektrotechnik.de www.hohner-elektrotechnik.de

DOC.ENCI.PR90X.M.002 | 07/15